

1 I claim:

2
3 1. A self-restrained pressure gasket for insertion within an annular groove provided in a bell end
4 opening of a female plastic pipe capable of both joining and sealing the female plastic pipe to a mating
5 male plastic pipe having an interior surface and an exterior surface, the gasket comprising:

6
7 an annular gasket body made of a resilient elastomeric material, the annular gasket body having an
8 inner circumferential region and an outer circumferential region;

9
10 a segmented ring formed of a plurality of hardened ring segments integrally molded within the
11 material of the gasket body so that the ring segments are at least partially embedded within the
12 resilient elastomeric material, each of the ring segments having an inner circumferential surface, an
13 outer circumferential surface, front and rear end faces and opposing sides;

14
15 at least one row of teeth located on the inner circumferential surface of at least selected ones of the
16 ring segments for engaging selected points on the exterior surface of the mating male plastic pipe;

17
18 wherein the ring segments are located within the annular gasket body with the inner circumferential
19 surfaces thereof forming an acute angle with respect to the inner circumferential region of the gasket
20 and with respect to the exterior surface of the mating male plastic pipe.

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22 2. The self-restrained pressure gasket of claim 1, wherein a plurality of rows of teeth are located on
23 the inner circumferential surface of at least selected ones of the ring segments.

24
25 3. The self-restrained pressure gasket of claim 1 wherein the acute angle which is formed between
26 the inner circumferential surface of the ring segments and the inner circumferential region of the
27 gasket is in the range from about 5 to 20 degrees.

1 4. The self-restrained pressure gasket of claim 1 wherein the plastic pipe is made of PVC.

2
3 5. The self-restrained pressure gasket of claim 1, wherein the end faces of the ring segments protrude
4 slightly from the resilient elastomeric material of the gasket body.

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6 6. The self-restrained pressure gasket of claim 1, wherein a plurality of rows of teeth are located on
7 the inner circumferential surface of at least selected ones of the ring segments, the teeth being initially
8 contained within the resilient elastomeric material of the gasket body and thus out of contact with the
9 exterior surface of the mating male pipe.

10
11 7. A pipe joint comprising:

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13 a female plastic pipe having a bell end opening with an annular groove for receiving a sealing gasket,
14 the bell end opening being sized to receive the spigot end of a mating male plastic pipe having an
15 interior surface and an exterior surface;

16
17 a self-restrained pressure gasket located within the annular groove provided in the bell end opening
18 of the female plastic pipe capable of both joining and sealing the female plastic pipe to the male plastic
19 pipe, the gasket comprising:

20
21 an annular gasket body made of a resilient elastomeric material, the annular gasket body having an
22 inner circumferential region and an outer circumferential region;

23
24 a segmented ring formed of a plurality of hardened ring segments integrally molded within the
25 material of the gasket body so that the ring segments are at least partially embedded within the
26 resilient elastomeric material, each of the ring segments having an inner circumferential surface, an
27 outer circumferential surface, front and rear end faces and opposing sides;

1
2 at least one row of teeth located on the inner circumferential surface of at least selected ones of the
3 ring segments for engaging selected points on the exterior surface of the mating male plastic pipe;

4
5 wherein the ring segments are located within the annular gasket body with the inner circumferential
6 surfaces thereof forming an acute angle with respect to the inner circumferential region of the gasket
7 and with respect to the exterior surface of the mating male plastic pipe; and

8
9 a circumferential gland fitting sized to be received about the outer surface of the mating male plastic
10 pipe, the gland fitting having a forward lip region which contacts and compresses the gasket body as
11 the joint is assembled.

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14 8. The pipe joint of claim 7, wherein a plurality of rows of teeth are located on the inner
15 circumferential surface of at least selected ones of the ring segments.

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17 9. The pipe joint of claim 7, wherein the acute angle which is formed between the inner
18 circumferential surface of the ring segments and the inner circumferential region of the gasket is in
19 the range from about 5 to 20 degrees.

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21 10. The pipe joint of claim 7, wherein the plastic pipe is made of PVC.

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23 11. The pipe joint of claim 7, wherein a plurality of rows of teeth are located on the inner
24 circumferential surface of at least selected ones of the ring segments, the teeth being initially
25 contained within the resilient elastomeric material of the gasket body and thus out of contact with the
26 exterior surface of the mating male pipe. wherein the end faces of the ring segments protrude slightly
27 from the resilient elastomeric material of the gasket body.

1 12. Method of joining and sealing a female plastic pipe to a mating male plastic pipe having an outer
2 pipe surface, the method comprising the steps of:

3
4 providing an annular gasket having an annular gasket body made of a resilient elastomeric material,
5 the annular gasket body having an inner circumferential region and an outer circumferential region,
6 the gasket body also having a segmented ring formed of a plurality of hardened ring segments
7 integrally molded within the material of the gasket body so that the ring segments are at least partially
8 embedded within the resilient elastomeric material, each of the ring segments having an inner
9 circumferential surface, an outer circumferential surface, front and rear end faces and opposing sides;

10
11 wherein at least one row of teeth is located on the inner circumferential surface of at least selected
12 ones of the ring segments for engaging selected points on the exterior surface of the mating male
13 plastic pipe;

14
15 wherein the ring segments are located within the annular gasket body with the inner circumferential
16 surfaces thereof forming an acute angle with respect to the inner circumferential region of the gasket;

17
18 inserting the gasket body into an annular groove provided within a bell end opening of the female
19 plastic pipe;

20
21 inserting the mating male plastic pipe into the bell end opening of the female plastic pipe with the male
22 and female pipes being aligned along a central axis with at least selected teeth of the hardened ring
23 segments being initially angled away from the outer surface of the male plastic pipe, the teeth of the
24 annular gasket being forced into engagement with the exterior surface of the male plastic pipe as the
25 pipe joint is assembled, the teeth being oriented to allow movement of the male pipe in a first
26 direction relative to the female bell end opening but to resist movement in a opposite direction.

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28 13. The method of claim 12, wherein a plurality of rows of teeth are located on the inner
29 circumferential surface of at least selected ones of the ring segments.

1 14. The method of claim 12, wherein the acute angle which is formed between the teeth of the ring
2 segments and the outer surface of the plastic pipe is in the range from about 5 to 20 degrees.

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4 15. The method of claim 12, wherein the ring segments have opposing front and rear end faces and
5 wherein the rear end faces of the ring segments protrude slightly from the resilient elastomeric
6 material of the gasket body.

7
8 16. A self-restrained pressure gasket for insertion within an annular groove provided in a bell end
9 opening of a female plastic pipe capable of both joining and sealing the female plastic pipe to a mating
10 male plastic pipe having an interior surface and an exterior surface to create a sealed pipe joint, the
11 gasket comprising:

12
13 an annular gasket body made of a resilient elastomeric material, the annular gasket body having an
14 inner circumferential region and an outer circumferential region;

15
16 a hardened ring located within the material of the gasket body so that the ring is at least partially
17 embedded within the resilient elastomeric material, the hardened ring having an inner circumferential
18 surface, an outer circumferential surface and front and rear end faces, the hardened ring having at
19 least one slit at one circumferential location which creates at least one gap between opposing faces
20 of the hardened ring when the gasket is in a relaxed state;

21
22 at least one row of teeth located on the inner circumferential surface of the hardened ring for
23 engaging selected points on the exterior surface of the mating male plastic pipe; and

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25 wherein the at least one gap in the hardened ring closes up as the pipe joint is assembled, thereby
26 allowing near or complete 360° contact of the hardened ring opposing faces and preventing the teeth
27 from engaging the outer surface of the male plastic pipe prematurely before the gasket has been
28 compressed enough to create a seal.

1 17. The self-restrained pressure gasket of claim 16, wherein the hardened ring is located within a
2 pocket provided in the elastomeric material of the gasket body, whereby the hardened ring is allowed
3 limited movement during expansion and contraction of the gasket.

4
5 18. A pipe joint comprising:
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7 a female plastic pipe having a bell end opening with an annular groove for receiving a sealing gasket,
8 the bell end opening being sized to receive the spigot end of a mating male plastic pipe having an
9 interior surface and an exterior surface;

10
11 a self-restrained pressure gasket located within the annular groove provided in the bell end opening
12 of the female plastic pipe capable of both joining and sealing the female plastic pipe to the male plastic
13 pipe, the gasket comprising:

14
15 an annular gasket body made of a resilient elastomeric material, the annular gasket body having an
16 inner circumferential region and an outer circumferential region, a forward extent and a rearward
17 extent;

18
19 a segmented ring formed of a plurality of hardened ring segments located on the forward extent of
20 the gasket body, the hardened ring segments being attached to the material of the gasket body, each
21 of the ring segments having an inner circumferential surface, an outer circumferential surface, front
22 and rear end faces and opposing side faces, each of the hardened ring segments being separated by
23 a gap at one circumferential location from a next adjacent ring segment when the gasket is in a
24 relaxed state;

25
26 at least one row of teeth located on the inner circumferential surface of at least selected ones of the
27 ring segments for engaging selected points on the exterior surface of the mating male plastic pipe;

wherein the gaps between the hardened ring segments close up as the pipe joint is assembled, thereby allowing near or complete 360° contact of the ring segment opposing side faces and preventing the teeth from engaging the outer surface of the male plastic pipe prematurely before the gasket has been compressed enough to create a seal; and

a circumferential gland fitting sized to be received about the outer surface of the mating male plastic pipe, the gland fitting having a forward lip region which contacts and compresses the gasket body as the joint is assembled.